



## CRS Report for Congress

### Air Force Aerial Refueling

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#### Summary

Aerial refueling aircraft are key to air operations. The U.S. tanker fleet is large and effective, but old. Modernizing or replacing the current fleet of tankers presents the Department of Defense (DOD) with difficult choices in terms of desired capabilities, force structure, and budget. How this fleet will be maintained or replaced, and on what schedule, has proven controversial. This report will be updated as events warrant.

#### Background

Modern military air operations require aerial refueling. Refueling aircraft, or tankers, extend the range of fighters, bombers, and other aircraft. Tankers increase the range and flexibility of projection forces. They increase the amount of time that combat and surveillance aircraft can stay “on-station,” and they boost combat aircraft lethality. According to senior Air Force officials, “Clearly the tanker fleet is really some of the very fiber that holds our Air Force’s unique global capabilities together. It is an essential enabler for getting to the fight and fighting the fight.”<sup>1</sup> Navy aircraft can be configured to refuel other Navy or Marine Corps aircraft, but the Navy prefers to use “big wing” Air Force tankers for long-range flight operations.<sup>2</sup> Air Force and Department of Defense (DOD) leaders believe they need 550-650 KC-135-like aircraft.<sup>3</sup>

**Air Force Capabilities.** The majority of the Air Force’s tankers are Boeing **KC-135 Stratotankers**. The Air Force owns 502 Stratotankers: 85 “E” models, and 417 more capable “R” models. The average KC-135 is approximately 45 years old. The KC-135 can carry 200,000 lbs of fuel that it dispenses to USAF aircraft through a flying boom. A drogue can be attached to refuel Navy, Marine Corps, or allied-country aircraft. The

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<sup>1</sup> A. Butler, “Air Force Mulling Replacement for Aging, Maintenance-Needy KC-135,” *Inside the Air Force*, May 4, 2001.

<sup>2</sup> Department of the Navy (N78) provided to CRS by email Sept. 2, 2005.

<sup>3</sup> See, for example, *Tanker Requirements Study-05*. Department of the Air Force, Air Mobility Command. February 2001, and *Mobility Capabilities Study* (MCS). December 2005.

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE <b>20 MAR 2007</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-2007 to 00-00-2007</b>	
4. TITLE AND SUBTITLE <b>Air Force Aerial Refueling</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Congressional Research Service, The Library of Congress, 101 Independence Avenue SE, Washington, DC, 20540-7500</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>6</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

Multi-Point Refueling System Program outfits 20 KC-135Rs with wingtip pods so the aircraft can simultaneously refuel two probe-equipped aircraft. The KC-135 can also carry 35,000 lbs of cargo in addition to its fuel payload. KC-135s are expected to fly until 2040.

The Air Force also owns 59 Boeing **KC-10A Extenders**. The KC-10 has an average fleet age of approximately 22 years. The KC-10 is more flexible and more capable than the KC-135. It can carry twice as much fuel as the *Stratotanker*, (356,000 lbs) and can be refueled in the air to increase delivery range or on-station time. All KC-10s use the flying boom, and 20 can employ wing tip probe and drogue systems. The KC-10 can carry up to 75 troops and 170,000 lbs of cargo in addition to its fuel payload, representing approximately 3% of all of DOD's organic airlift capability. Current plans call for the KC-10 to remain in the active inventory through 2040.

A brief review of recent conflicts underscores the importance of tanker aircraft. In both Iraq and Afghanistan, U.S. military aircraft projected power over long distances and in theaters with less than desirable access to forward bases or neighboring airspace. Thus, combat and support aircraft had to fly great distances both to the theater and while in theater, increasing aerial refueling demands. A large proportion of the Air Force's aerial refueling fleet (149 KC-135s, and 33 KC-10s) participated in Operation Iraqi Freedom, flying over 6,000 sorties and offloading over 300 million pounds of fuel.

**Modernization Controversy.** Modernizing or replacing the Air Force tanker fleet has been a point of contention for 10 years. In 1996, the General Accounting Office (GAO) asserted that the long-term viability of the KC-135 fleet was questionable and advocated expeditiously studying replacement options. DOD countered that KC-135 airframe hours were low and that the fleet was sustainable for another 35 years.<sup>4</sup> In 2001, the Air Force reported that the KC-135 fleet would incur "significant cost increases" between 2001 and 2040, but "no economic crisis is on the horizon...there appears to be no run-away cost-growth," and "the fleet is structurally viable to 2040."<sup>5</sup> At that time, the Air Force position on tanker modernization was to conduct an analysis of alternatives (AOA) to determine the optimal replacement option for KC-135s. Recapitalization would begin in the 2012 time frame to meet the KC-135 2040 retirement.

Section 8159 of the FY2002 DOD Appropriations Act (P.L. 107-117) authorized the Air Force to lease 100 Boeing KC-767 aircraft to replace the oldest KC-135Es. This proposal proved controversial because section 8159 appeared to depart from traditional acquisition processes and to weaken congressional oversight. It was also established that a lease would cost more than procuring the aircraft, and many found Air Force arguments in favor of the lease to contradict its position of just a year prior. The proposed lease was debated in four congressional hearings, culminating with a pair of Senate hearings in September 2003.<sup>6</sup> Subsequently, alleged and admitted ethical violations by government and industry representatives involved in the lease proposal added to the controversy.

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<sup>4</sup> GAO/NSIAD-96-160.

<sup>5</sup> "KC-135 Economic Service Life Study," Technical Report F34601-96-C-0111, Feb. 9, 2001.

<sup>6</sup> See CRS Report RL32056, *The Air Force KC-767 Tanker Lease Proposal: Key Issues For Congress*, by Christopher Bolkom.

The FY2004 Defense Authorization Act (P.L. 108-136, Sec.135) forged a compromise between opponents and proponents of the KC-767 by giving the Air Force permission to lease 20 tanker aircraft and purchase 80 aircraft. Section 134 of this act prohibited the Air Force from retiring in FY2004 more than 12 KC-135Es. In September 2004, it was announced that the Air Force had grounded 29 KC-135Es due to safety concerns. Conferees also mandated that the Air Force conduct an aerial refueling AOA and that an independent assessment be conducted on the condition of the KC-135E fleet.

On February 1, 2004, former Deputy Secretary of Defense Paul Wolfowitz requested that the Defense Science Board (DSB) conduct the independent analysis of the KC-135E fleet, and on February 24, 2004, former acting Undersecretary of Defense for Acquisition Michael Wynne directed the Air Force to conduct an aerial refueling AOA. Although it had the statutory authority to proceed, DOD did not request any funds for FY2005 to lease 20 aircraft or procure 80 aircraft. Defense Department leaders instead deferred executing either action until the completion of the DSB report, and an internal investigation by the DOD Inspector General (IG) on potential improprieties by Boeing Company executives and whether these activities negatively effected the Tanker lease program.

On April 20, 2004, Darleen A. Druyan, the former lead Air Force negotiator on the tanker lease program, pleaded guilty to one charge of criminal conspiracy. Ms. Druyan admitted to secretly negotiating an executive job with the Boeing company while still overseeing the \$23 billion deal between the Air Force and Boeing.<sup>7</sup> Lease supporters argued that Ms. Druyan was a single “bad apple” and that her actions did not negate the KC-767’s merits. In February 2005, however, it was reported that the DOD IG found that Air Force Secretary James Roche misused his office when he lobbied the Office of Management and Budget (OMB) to support the lease concept.<sup>8</sup> The IG’s final report found that four other senior DOD officials were guilty of evading OMB and DOD acquisition regulations that are designed to demonstrate best business practices and to provide accountability. The DOD IG found that senior DOD officials knowingly misrepresented the state of the KC-135 fleet and aerial refueling requirements.<sup>9</sup>

## Issues for Congress

As DOD pursues its KC-135 recapitalization program, several issues appear to compete for congressional attention.

**Is it fair?** There has been much dialogue in the media that the first draft of the KC-X request for proposal ( RFP) was biased toward the capabilities apparent in the KC-767. Close review of this RFP is understandable in light of the controversy surrounding past tanker recapitalization efforts. It is important to note within this context, that the driving force behind DOD’s weapon acquisition system is designed to be warfighter requirements, not what is most profitable to company x or company y. Northrop Grumman and Airbus reportedly complained that the original KC-X RFP did not

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<sup>7</sup> R. Merle, “Ex-Pentagon Official Admits Job Deal,” *Washington Post*, Apr. 21, 2004.

<sup>8</sup> R. Jeffrey Smith, “Roche Cited for 2 Ethics Violations,” *Washington Post*, Feb. 10, 2005.

<sup>9</sup> *Management Accountability Review of the Boeing KC-767A Tanker Program*, Office of the Inspector General of the Department of Defense, OIG-2004-171, May 13, 2005.

adequately address how the candidate aircraft's airlift capability would be evaluated, and they feared that the Air Force might not look upon the airlift capabilities of their aircraft (the larger KC-30) as favorably as it should.

In the absence of detailed airlift evaluation information, however, Airbus could have offered a smaller aircraft, such as its A300/A310 class, which it might believe corresponded more closely to Air Force requirements.<sup>10</sup> Similarly, if Boeing believed the Air Force desired a larger aircraft with more airlift capability, it could have conceivably offered its 777 aircraft.

Reduced demand of defense-unique systems and the resulting consolidation of the defense industrial base has frequently reduced the number of companies available to provide a given defense article, which adversely affects competition. Therefore, some compromise between a warfighter's "perfect world" requirements and real world industrial capabilities is inevitable. However, substantially modifying warfighter requirements or Key Performance Parameters (KPPs) to jibe with what industry wants to offer, would appear to reflect an imbalance between requirements and capabilities.

As DOD defines its requirement, there appears to be nothing obvious in the KC-X RFP that would inherently bias the contract award in favor of any platform that could be offered by the competitors. The RFP makes clear, however, that the aircraft's primary mission is refueling DOD and allied aircraft with the flying boom mechanism. Any passenger or cargo carrying capability is deemed a "secondary mission."

**Is it affordable?** DOD's Aerial Refueling Analysis of Alternatives (AR AOA) found that purchasing new commercially-derived tankers was the most cost effective means of *initially* recapitalizing the fleet.<sup>11</sup> This conclusion appears to be widely shared among defense analysts. However, this course of action is also capital intensive when compared with other potential courses of action, and the AR AOA noted that "affordability (annual budget outlays)" was an important factor that should "drive the acquisition schedule for tanker recapitalization."<sup>12</sup>

At one time, the KC-X program was described as a 540-aircraft effort. The recent Air Force description of the 179-aircraft KC-X program, however, portrays it as the first of three potential efforts – followed by the KC-Y and KC-Z, which combined, would add up to approximately 540 new tanker aircraft. This new conceptual framework may indicate implicit Air Force recognition that 540 new aircraft are likely unaffordable: Air Force staff have described the KC-Y and KC-Z programs as budgetary "off ramps."<sup>13</sup> Therefore, Air Force leaders might conceivably be more receptive to Congressional direction on other potential recapitalization options for the KC-Y and KC-Z programs.

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<sup>10</sup> The last A300/A310 class aircraft are estimated to be produced in July 2007. The A300/A310 production line is in the process of being terminated. However, if Airbus believed that a medium sized tanker was more compatible with Air Force requirements and therefore more competitive than a larger A330-class aircraft, Airbus could have taken steps to keep the line open.

<sup>11</sup> KC-135 Recapitalization Analysis of Alternatives. Briefing to Congress. January 26-27, 2006.

<sup>12</sup> Ibid. p.5.

<sup>13</sup> Meeting between CRS and SAF/AQQ April 4, 2006, and follow-on interviews.

The 2004 DSB Task Force on Aerial Refueling Requirements was an early proponent of examining less capital-intensive recapitalization options. The DSB recommended that DOD give “serious consideration” to purchasing surplus commercial aircraft such as the DC-10, re-engining some fraction of the KC-135E fleet, and expanding its use of commercial Fee-For-Service aerial refueling (FFS AR).

The Air Force has consistently argued against re-engining KC-135Es and purchasing surplus commercial aircraft. However, the AR AOA appears to agree with the DSB – although with distinct caveats – that purchasing used aircraft may merit additional study. The AR AOA found that purchasing used aircraft as tankers is “generally not as cost effective” (as purchasing new aircraft), but “...close enough in estimated cost to not exclude it from competition.”<sup>14</sup> Surplus DC-10 aircraft, in particular, might offer attractive means of acquiring aerial refueling capabilities for less money up-front, and since the Air Force already operates KC-10 aircraft, significant additional investments may not be required in operations, maintenance, and supply.

Similarly, the AR AOA did not rule out re-engining some number of KC-135Es. The study found that re-engining “E” models was “not a favorable return on investment unless operated into late 2030s.”<sup>15</sup> In an earlier study, the Air Force concluded that the KC-135E fleet is “structurally viable until 2040.”<sup>16</sup> A 2005 Air Force Study estimated, with numerous caveats, that KC-135E aircraft upgraded to the “R” configuration would remain viable until 2030.<sup>17</sup> When evaluating these life-span projections, it may be useful to review the findings of a third party. The DSB found that KC-135 corrosion problems (a major determinant of costs and life span) were more manageable than Air Force statements led some to believe, and that current and projected KC-135 operations and support costs were also less than Air Force projections. If the DSB is correct, this may lend credence to a longer life-span for KC-135 aircraft.

In FY2008, the Air Force proposes to retire its last 85 KC-135E aircraft, giving Congress one last opportunity to assess the pros and cons of investing approximately \$45 million per aircraft to re-engine some number of “E” models. If Congress believed that the Air Force’s aerial refueling budget was unsustainable, re-engining 10 KC-135E aircraft for \$450 million and operate them until 2040 might appear more favorable than acquiring some number of new tankers at a procurement cost of \$120-\$150 million each.

The KC-X RFP, “Part B” addresses Fee-for-Service aerial refueling (FFS AR), but many have questioned the strength of the Air Force’s commitment to this recapitalization approach.<sup>18</sup> At one point the Air Force planned to complete a FFS AR Business Case Analysis (BCA) in December 2006, and to let an RFP in January 2007 “if merited.” (A CRS assessment of the proposed BCA methodology and assumptions can be found in Appendix 2 to this statement.) The current status of FFS AR is unclear.

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<sup>14</sup> AOA Briefing to Congress. Op. Cit.

<sup>15</sup> AOA Briefing to Congress. Op. Cit.

<sup>16</sup> *KC-135 Economic Service Life Study*. Technical Report. February 9, 2001.

<sup>17</sup> *KC-135 Assessment Report*. Air Force Fleet Viability Board. September 2005.

<sup>18</sup> CRS interviews with congressional staff, Air Force, and industry (Oct. 2006 to Feb. 2007).

**Will DOD's plans produce what is needed?** It is difficult to evaluate DOD's recapitalization plan because there is no current or clear tanker requirement study. The last comprehensive tanker requirement study performed by DOD was the Tanker Requirements Study 2005, or TRS-05, which was completed in 2001. TRS-05 concluded that to meet the National Military Strategy, DOD required 500-600 KC-135R - equivalents, with an 85% Mission Capable Rate, and 900-1,000 aircrews, for a crew ratio of 1.66 crews per aircraft to 1.92 aircrews per aircraft. The Mobility Capabilities Study reportedly recommended the acquisition of 520 - 640 KC-135R model equivalents.<sup>19</sup>

Because DOD's last tanker requirements study is outdated, and because subsequent analyses failed, for many, to provide insight into tanker and airlift requirements, many significant questions remain unclear. For example, how much airlift capability should the aerial refueling fleet provide?" Some within DOD appear to believe that the KC-X should provide more airlift capability. In April 2006, DOD's top military transportation commander expressed a strong preference for a multi-role tanker. Gen. Norton Schwartz, Commander U.S. Transportation Command (TRANSCOM) testified that

What we need is a multi-mission tanker that can do both boom and basket refueling, that can do passenger lift, some cargo lift, and have defensive systems that allow the airplane to go wherever we need to take it....if we're going to war with Iran or Korea or over Taiwan or a major scenario, the first 15 to 30 days are going to be air refueling intensive. But what I'm talking about is the global war on terrorism, sir, for the next 15 or 20 or 25 years. That is not an air refueling intensive scenario and that's why a multi-mission airplane to me makes sense.<sup>20</sup>

The DSB agreed with Gen. Schwartz's opinion on refueling requirements and the availability of tankers to provide airlift missions. "The major driver for future aerial refueling needs is the number and type of nearly simultaneous "major" operations. Demands on aerial refueling are particularly stressed when time is of the essence for the mission and when local infrastructure is immature."<sup>21</sup>

The amount of airlift ultimately to be provided by the tanker fleet could have important implications for other air mobility programs. The Air Force's 59 KC-10 *Extender* aerial refueling aircraft currently represent approximately 3% of DOD's organic airlift capability. The procurement of larger KC-X aircraft could increase the percentage of airlift capacity provided by the tanker fleet, and could potentially reduce the number of cargo aircraft such as C-5s and C-17s. The procurement of smaller KC-X aircraft could potentially have the opposite effect. In the April 2006 hearing, Gen. Schwartz testified to this trade-off: "If I had an airplane that could carry passengers there with defensive systems, like a new tanker, I would use that instead, and we would be able to better manage the workload on the C-17 fleet and apply it against the things that it does exceptionally well, moving cargo."

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<sup>19</sup> *KC-135 Tanker Replacement (KC-X) Program*. SAF/AQQM. FY08 Staffer Brief. Feb. 2007.

<sup>20</sup> "Senate Armed Services Subcommittee on Seapower Holds Hearing on FY2007 Budget: Transportation Command." *CQ Congressional Transcripts*. April 4, 2006

<sup>21</sup> Defense Science Board Task Force on Aerial Refueling Requirements. Office of the Under Secretary of Defense For Acquisition, Technology, and Logistics. May 2004. p. vi.